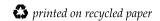


Vehicle and Equipment Washwater Discharges

Best Management Practices Manual



June 1995 Publication WQ-R-95-56



Vehicle and Equipment Washwater Discharges

Best Management Practices Manual

Washington State Department of Ecology Water Quality Program Permit Management Section P.O. Box 47600 Olympia, WA 98504-7600

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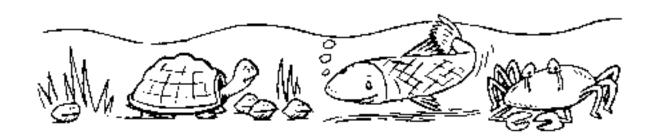
Section 1

Introduction

This guidance manual discusses the environmental concerns over discharges from washing the exterior surfaces of vehicles and equipment such as cars and/or trucks, and light or heavy equipment. It provides Best Management Practices (BMPs) for the collection, treatment, and disposal of waste water generated by large/commercial vehicle/equipment washing operations in Section 2. This document also provides guidance for pollution prevention by offering the "do's and don'ts" of discharge control for some common types of operations in Section 3.

Why Should We Be Concerned With Vehicle Washwater? Washwater from vehicle/equipment cleaning activities may contain significant quantities of oil and grease, suspended solids, heavy metals, and organics, as well as pollutants from detergents. These pollutants can be toxic and harmful to living organisms, including fish and people who ingest them. Oil and grease contain hydrocarbon compounds, some of which can injure or kill aquatic life even at low concentrations. Oil and grease can also coat fish gills and prevent oxygen from entering water, starving fish and other aquatic life.

Some detergents may contain metals such as arsenic; when dissolved, metals are toxic to living organisms. Detergents contain emulsifiers that break up oil particles; emulsifiers can also cause harm to aquatic life. Many detergents also contain nutrients such as phosphorous and nitrogen. High nutrient levels in streams and lakes can harm water quality by stimulating excess weed and algae growth, causing unpleasant odors and sights, and depleting oxygen levels necessary to support fish life.



Section 1 1

What Types of Operations Are Covered By This Document?

The operations listed below are just a few that discharge washwater and have the opportunity to prevent pollution in Washington State waters. Best management practice recommendations for each operation are listed further on in this manual.

Section 2 covers:

Businesses that regularly wash vehicle/equipment exterior surfaces other than those addressed in Section 3. Engine cleaning and the cleaning operations that use acids, caustics, or other metal brighteners should follow the BMPs for discharges to municipal sewerage systems or use closed-loop water recycling systems.

Section 3 covers:

- * At-site rinsing of farm and construction vehicle/equipment;
- Mobile washers;
- Washing vehicle exteriors at new and used car/truck dealerships;
- Small dischargers (1 or 2 pieces of equipment and or vehicles per day and not to exceed 8 per week); and
- Charity car washes.

What Types of Operations Are Not Covered By This Document?

The washwater generated from the washing of tank truck interiors is not included in this guidance document. Washwater generated from cleaning of the tank truck interiors must be collected, treated, and disposed of in accordance with a treatment and disposal system approved by the Washington State Department of Ecology or a municipality with delegated pretreatment authority. The required treatment will vary with the cargo hauled by the tanker truck. In short, discharge of these washwaters to surface waters, municipal sewerage systems, or to the ground requires a permit or a discharge authorization.

The BMPs in this document may not be adequate to protect groundwater resources in sensitive areas, such as, sole source aquifer, well head protection areas, or other designated groundwater protection areas.

This document does not cover vehicle washwater discharges to surface water.

Washwater Discharge Options

There are four options available for the disposal of vehicle washwater.

- ❖ Preferred option: Zero discharge, or closed-loop water recycling;
- Second option: Discharge to a municipal sewerage system;
- Third option: Discharge to land or ground; and
- Fourth option (not recommended): Discharge to surface water.

Of these options, zero discharge, or the use of water recycling systems is the preferred option and is strongly encouraged. The second most preferred option is to discharge to a municipal sewerage system. The third option is to discharge to the ground.

Due to the high degree of treatment and extensive (and costly) monitoring that are required for discharges to a surface water body or storm sewer, this option is not recommended and will not be further addressed in this document. Such discharges must be authorized by a National Pollutant Discharge Elimination System (NPDES) Permit issued by Ecology. For more information, contact your closest Ecology regional office. (See list at end of this document.)

Zero Discharge or Closed-Loop Water Recycling Systems

A closed-loop system uses recycled water and has zero discharge. However, closed-loop water recycling systems may use chemicals to help remove solids from the waste. Systems that do use chemicals generate chemical sludge which must be handled safely and disposed of in a manner that will not cause pollution of the waters of the state. Also, the closed-loop recycling systems may have a reservoir to store the recycled water for reuse. It may be necessary to discard the reservoir water periodically as oil, grease, and other pollutants accumulate. The following steps should be followed for safe handling and disposal of the sludge and the contaminated reservoir water generated by these systems:

- ❖ The sludge generated in these systems seldom designates as a hazardous or dangerous waste (per Chapter 173-303 WAC, Dangerous Waste Regulations), and it can usually be disposed of in a sanitary landfill. To be sure, check with your local health department and/or landfill operator. If still in doubt, test the sludge to determine if it designates as a hazardous or dangerous waste.
- ❖ If the sludge designates as a hazardous or dangerous waste, it must be disposed of through a permitted treatment, storage, and disposal (TSD) facility. Also, requirements for storage of dangerous wastes (Chapter 173-303 WAC), such as secondary containment, would apply to a sludge that designates as a hazardous or dangerous waste.
- The contaminated reservoir water should be discharged to a municipal sewerage system with the prior authorization from the local sewer authority.

Discharges to a Municipal Sewerage System

Discharges to a municipal sewerage system receive treatment by the municipal treatment facility before they are finally discharged to the environment (rivers, lakes, sea water, or the land). Dischargers must obtain approval from the local sewer authority prior to discharge. Many local sewer authorities have limits on pollutant concentrations in the discharge that dischargers must meet. Local sewer limits are to:

- protect water quality of the receiving water body;
- protect sewage sludge quality, making sure that it is a usable product;

Section 1 3

- prevent operational problems at the sewage treatment plant and in the collection system; and
- protect worker health and safety.

This manual contains some recommendations for the collection and treatment of the washwater prior to discharge to a municipal sewerage system (see Section 2).

Discharges to the Ground

Discharges to the ground must be treated to prevent ground water pollution. Section 2 of this manual contains the recommended treatment BMPs for washwater generated by large commercial operations prior to discharge to the ground. A grassy ground surface can provide treatment for small and infrequent discharges. Section 3 of this manual provides some do's and don'ts recommendations for such dischargers.

Regardless of the number and type of vehicle washing activity, all discharges to ground water must comply with state ground water standards (Chapter 173-200 WAC). In some areas of the state, such as those over sole source aquifers, discharge to ground may not be allowed or may require further controls. In those sensitive areas, closed-loop water recycling or other options would be necessary. For more information, contact your nearest Ecology office or local government.



Section 2

Recommended BMPs for Collection, Treatment, and Disposal of Washwater

This section contains the recommended BMPs for collection, treatment, and disposal of washwater generated from large/commercial operations washing vehicle/equipment exterior surfaces. The following provide recommended BMPs for two treatment and disposal options. These are the BMPs for discharges to a municipal sewerage system and for discharges to the ground. Where a municipal sewerage system is accessible, the washwater should be discharged to such a system with the approval of the local sewer authority and following the treatment BMPs for discharges to municipal sewerage systems (see following page). Washwater discharges to the ground should be adequately treated so as not to cause violation of state ground water standards (Chapter 173-200 WAC). However, when feasible, the use of closed-loop water recycling systems to treat and reuse the washwater is strongly recommended over discharges to the municipal sewerage systems or the ground.

Washwater Containment and Collection

Vehicle and/or equipment washing should be conducted in a building or in one of the preferred designated areas described below.

- 1. At a commercial washing business in which the washing occurs in an enclosure and drains to a municipal sewerage system, a treatment facility, or a dead end sump.
- 2. In a building constructed specifically for washing of vehicles and equipment which is plumbed to drain to a municipal sewerage system, a treatment facility, or a dead end sump.
- 3. In an outside area without walls and/or roof designated as a wash area, meeting the guidance for uncovered wash areas outlined below.

Uncovered Wash Areas

The following guidance is designed to prevent release of oil and grease, metals, and washwater into the environment and minimize the discharge of precipitation to the collection system. Designated uncovered wash area should be:

- ❖ Impervious and graded to collect all washwater in a drain system, and constructed as a spill containment pad to prevent the run-on of stormwater from adjacent pavement areas. The containment pad should be sized to extend out a minimum of four feet on all sides of the vehicles and/or equipment being washed.
- Discharging to a municipal sewerage system, a treatment facility, or a dead-end sump for transportation to the nearest treatment facility.
- Discharging through a pipe that has a positive control valve (manual or automatic) that is shut when washing is not occurring. This prevents the entry of stormwater. Signs should be posted to inform people of the operation and purpose of the valve.
- Cleaned before a rain event.

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Also:

- A portland cement concrete spill containment pad is recommended for steam cleaning.
- The wash area should be well marked at gas stations, multifamily residences, and any other business where vehicles may be washed by nonemployees. Included in the posting will be a statement forbidding the changing of oil in the wash area and the location of the nearest oil recycling facility. See Figure 1 for an illustration of these requirements.

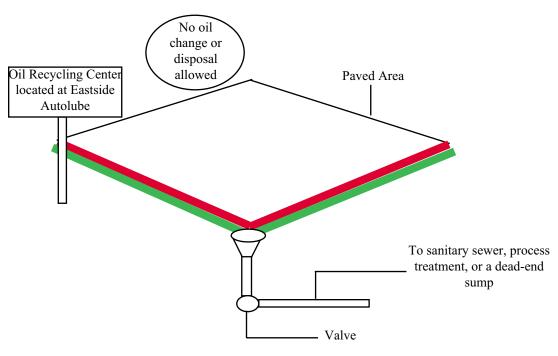


Figure 1. Requirements for an Uncovered Wash Area

Discharges to a Municipal Sewerage System

Treatment System

The washwater must be adequately treated to meet the local sewer authority's discharge requirements. In general, local sewer authorities have pollutant concentration limits for total suspended solids (TSS), oil and grease (O & G), and metals. A gravity separator such as an American Petroleum Institute separator (API, or baffle) or Coalescing Plate Separator (CPS) can be used prior to discharge to a municipal sewerage system. The expected effluent TSS and O & G concentrations are less than 100 ppm and 50 ppm, respectively. However, depending on the type and quantity of the detergent used, the efficiency of the gravity separation systems for total O & G removal may be reduced. Figures 2 and 3 show examples of the API and CPS systems. The API separator has a grit/sludge removal baffle allowing solids separation. A pretreatment unit for solids separation (e.g., a grit trap) may have to precede the CPS system. The flow residence time through the API system should not be less than 30 minutes at the highest expected discharge flow.

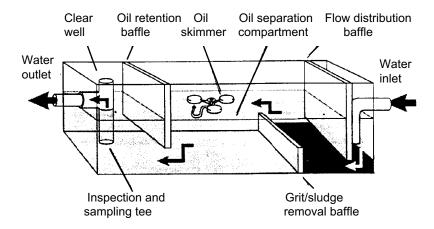


Figure 2. An API Separator

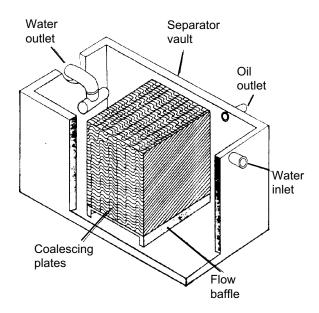
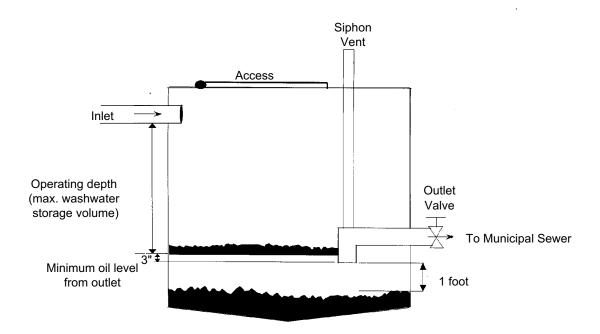


Figure 3. A Coalescing Plate Separator

Alternatively, washwater can be discharged to a containment sump, similar to that in Figure 4, with a gravity separation overflow and a positive control valve at the connection to the municipal sewer. The sump minimum containment volume should be sized to accommodate the maximum expected daily flow plus the sludge storage volume below the outlet pipe. The outlet valve will be shut during the washing operation and the washwater will be stored in the volume provided. The valve should remain shut at least two hours following the last washing operation to allow oil and solids separation under a quiescent condition. After this quiescent period, the valve can be opened to allow discharge to the municipal sewer. Such a containment sump is operated on a daily cycle. Larger containment volumes can be used to store more than one day's flow.



Operation: During the washing operation the outlet valve is shut. Washwater is stored in the sump. The valve should remain shut for at least 2 hours after the last washing operation. The washwater is discharged to the municipal sewer after the quiescent period by opening the outlet value.

Figure 4. A Typical Containment Sump

The sludge volume generated in a containment sump can be quite variable. In an EPA study, the median TSS concentration from the wand type car wash facilities was 659 ppm (the range was from 106 to 2970 ppm). Based on this median TSS concentration and assuming a sludge solids concentration of 5 percent, the sludge volume generated from 3,000 gallons of washwater is approximately 40 gallons. The same EPA study reported the median TSS concentrations from the roll-over and the tunnel types car washes as 158 and 101 ppm, respectively (the ranges were 30-576 ppm for roll-over type and 36-848 ppm for tunnel type). To prevent resuspension and suction of the solids in discharge to the municipal sewer, the sludge depth should remain one foot below the outlet. Also, the floating oily layer should stay well above the outlet pipe to prevent its discharge to the municipal sewer.

Maintenance

Any grit traps used should be inspected daily and cleaned as needed, but not less than once per week. The gravity separation unit should be operated and maintained according to the manufacturer's recommended maintenance procedures at the specified frequencies or as needed. Oil accumulation in an API system should be checked at least once a week or more frequently as needed. If it exceeds three inches, the unit must be cleaned. Generally, the manufacturer's recommendations for cleaning of the horizontal coalescing plates in a CPS system is when the gap between the plates has been reduced by 40 percent. These requirements may be different for each case and, ultimately, the owner/operator is responsible for the proper and periodic maintenance and operation of the separator in use. The containment sump in Figure 4 should be inspected during each fill and discharge cycle and cleaned before the accumulating sludge and oil layers have reached the limits shown in the figure. A log of all maintenance activities should be kept on-site and made available to Ecology or the local sewer authority when requested. The log should include the type of activity, name of person responsible for the activity, and time and date of the activity.

Solids and other materials removed from the treatment system must be disposed at a location and in a manner so as to not cause pollution of any of the waters of the state. If the wastes do not designate as a hazardous or dangerous waste, disposal in a sanitary landfill with the approval of the jurisdictional health authority, may be a practical option. Waste disposal companies may be contacted for help in cleaning and disposal of the separator's content.

Discharges to Ground

The following describes components of an acceptable treatment system and the maintenance activities needed for washwater discharges to the ground. Other treatment alternatives that provide an equivalent or better treatment of the washwater may be used. Sanitary wastes (sewage) should not be discharged to the washwater treatment systems.

Treatment System

The treatment system must produce an effluent that will not cause violation of the Washington State ground water quality standards. The treatment system recommended includes a gravity separation unit such as those described for BMPs for discharges to a municipal sewerage system.

Also, additional treatment of the effluent from the gravity separation unit should occur for further removal of the residual oil and metals. It is recommended that a 4 to 5 feet deep multimedia filter as shown in Figure 5 be used to treat effluent from the gravity separation system. The selected media should provide treatment capacity for removal of colloidal and dissolved heavy metals. The multimedia filter in the Figure 5 includes a layer of peat over the sand media. Other organic

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media, such as, compost, can be used in place of peat to achieve further removal of the residual oil and heavy metals. For the multimedia sand filter shown in figure 5, it is recommended that the calculation for the required filter area be based on a flow application rate of 20 gallons per square foot per day or less.

Sampling ports should be provided to sample the influent and effluent of the treatment system and effluent from the gravity separation unit. With proper operation and maintenance of the treatment system the average effluent TSS and O & G should be under 75 ppm and 10 ppm, respectively. The treatment system is expected to remove other pollutants of concern such as the heavy metals and oil or petroleum residues to levels that meet the ground water quality standards. However, it should be emphasized that data on performance of the above treatment system is lacking. If the effluent quality from such systems does not meet the applicable ground water standards, additional treatment options, such as the use of activated carbon columns, should be implemented.

Freezing temperatures could cause the filter media to freeze especially when they are dosed infrequently, therefore consideration should be given to locating the filter unit below the frost line.

Additional Information on Peat

The hydraulic conductivity or the flow velocity through the peat layer will probably control the flow application rate. For this reason, prior experience or testing of the peat to be used may be necessary. The most common type of peat is fibric peat (e.g. sphagnum moss) which is made up of mostly undecomposed fibrous organic materials. It is typically brown and/or yellow in color, has a high hydraulic conductivity (56 in/hr), and is extremely acidic. On the other hand, sapric peat is made up of highly decomposed organic materials and is typically very dark gray and has very low hydraulic conductivity (0.01 in/hr). Hemic peats are intermediate in their properties. The peat selected should be able to handle the flow application rate of 20 gal/ft2-d (about 1.3 in/hr). High acidity may cause mobilization of some metals and lead to a higher metals concentration in the effluent. For this reason the media pH should be near neutral. Mixing some crushed shells with peat may be one way of stabilizing the pH of an acidic peat at near neutral. On the other hand, some detergents are buffered at or near neutral pH which may prevent acidic pHs in the media. The use detergent should not cause the effluent pH to increase above 8.5.

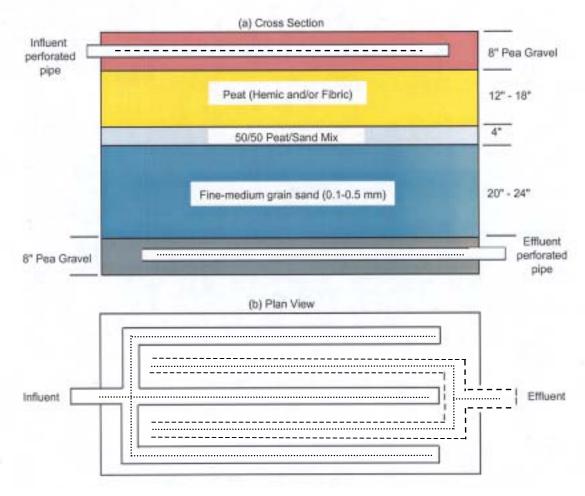


Figure 5. Multi-Media Peat Sand Filter

Drainfields

Following the treatment system, discharges to ground should be through drainfields designed in accordance with the Washington State Department of Ecology's <u>Stormwater Management Manual for the Puget Sound Basin (2/92)</u>, the "technical manual," or other manuals approved by Ecology. Approval of the local health department may also be required.

Maintenance

A maintenance program for the treatment system should include the following:

- Daily inspection of any grit traps used and cleaning as needed but not less than once per week.
- For gravity separation units, follow the manufacturer's recommended maintenance procedures at the specified frequencies or as needed.

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❖ As part of the operation and maintenance procedure, regular monitoring of the treated effluent is recommended. To ensure that the system is properly operating and achieving the expected level of washwater treatment, the treated effluent should be sampled and analyzed for:

Oil and Grease, every six months; and Metals (As, Cd, Cu, Cr, Pb, Ni, Zn), annually.

- Multimedia filters should be replaced as necessary to maintain adequate treatment capacity to ensure compliance with the water quality standards.
- Solids and other materials removed from the treatment system should be disposed at a location and in a manner that does not cause pollution of any of the waters of the state. Disposal in a sanitary landfill may be a practical option. Approval of the landfill operator should be obtained.
- ❖ A log of all maintenance activities should be kept at the site, and made available to Ecology or local sewer authority when requested. The log should include the type of activity, name of person responsible for the activity, and time and date of the activity.

Section 3

At-site Rinsing of Farm and Construction Vehicles/ Equipment

The following applies when rinsing is performed to prevent tracking of dirt, sediment, and floatable materials and to remove pesticide residuals from farm and construction vehicle/equipment exterior surfaces.

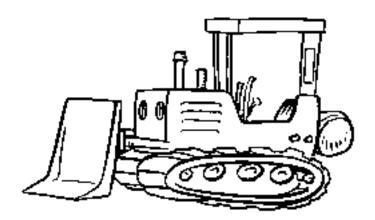
Do * Farm and construction vehicle/equipment should be field washed over a grassy ground or dirt area where it can soak into the ground, evaporate, or otherwise be kept out of surface waters or storm

- Pesticide truck exterior should be rinsed with water at the field to remove pesticide chemical residues before they are brought to a central washing area.
- Where washing occurs on impervious surfaces, a catch basin with a gravity separator (e.g. an oil/water separator) should be used. Discharge from the gravity separator should go to a grassy ground surface or dirt area, or it can be directed to a sanitary sewer where available.

Don't • Do not use soap, detergents, or cleaners.

- ❖ Do not discharge to a storm sewer or surface water.
- ❖ Do not pressure wash vehicles with other than cold water.
- ❖ Do not steam clean.

sewers.

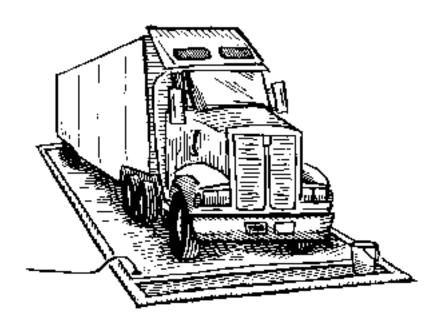


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Mobile Washers

- **Do** * Washwater should be collected and discharged to a municipal sewerage system; or reused in a closed-loop water recycling system; or hauled to a treatment facility.
 - Mobile washing operations must be performed on an impervious surface (i.e., concrete, plastic, or other) to contain and collect the washwater. The impervious surface must extend to a minimum of 4 feet on all sides of vehicle/equipment to trap overspray.
 - ❖ Mobile washers must use a portable impervious surface material when washing on a porous surface. A portable wash pit, vacuum recovery unit, or comparable device must be used to collect washwater for proper disposal.
 - ❖ Where washing is over an impervious area draining to a storm sewer, a temporary plug should be placed in the storm drain and the accumulated water pumped to the nearest sewerage system.
 - The wash area should then be cleaned or rinsed with water before a rain event and the washwater collected and discharged in a similar manner.
 - Consult your local sewer utility about diverting washwater to the sanitary sewer through collection and pumping.

Don't • Do not discharge to storm sewers or surface waters.



Washing Vehicle Exteriors At New And Used Car/ Truck Dealerships

The following recommendations are for rinsing vehicles with cold water. Cleaning operations using soaps, detergents, or other cleaners should contain the washwater and discharge it to a municipal sewerage system with approval from the local sewer authority or use closed-loop water recycling systems.

Do • Vehicles may be rinsed in the parking stalls as long as only cold water is used.

- ❖ The rinse water must be directed away from storm drains to a grassy swale or a landscaped area.
- ❖ If rinse water is allowed to run off to a storm drain, the drain should be retrofitted with catch basins to trap sediment and floating oils (see below).
- Washing operations with soaps or detergents should discharge to a sanitary sewerage system.

Don't *

- Do not use soap, detergents, or cleaners.
- ❖ Do not discharge to surface water or a storm sewer without a catch basin or an equivalent treatment system.
- ❖ Do not steam or pressure clean engines.

Catch Basins Design Information

- Each trapped catch basin serves up to one acre of an impervious (pavement, cement, etc.) surface area
- The inlet must have a shut off valve that is shut when washing is not occurring. This prevents the entry of stormwater.
- A catch basin's size is 2.5'x 2.5' by 48" deep. A steel grated cover on the basin must trap large floating debris and the outlet pipe must contain an inverted elbow.
- A sediment sump must be 24" minimum below the outlet pipe invert.
- Catch basins must be cleaned of solids and oil when 30 percent full with solids, or at least once a year. Catch basins should be cleaned during dry weather to prevent discharge of pollutants into the storm sewer. Solids and oil must be disposed of in a dumpster with prior notification of the local health department.

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Small Dischargers

Small dischargers are defined as those where washing is carried out infrequently:

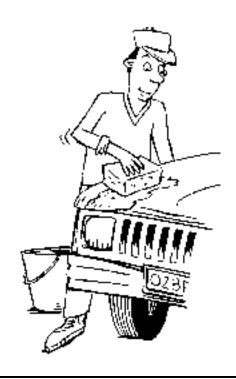
- Involving 1 or 2 pieces of equipment and/or vehicles per day, not exceeding eight during any week; and/or
- Discharging less than 100 gallons of washwater each day; and
- Washing of the vehicle/equipment is not the primary business activity of the discharges. For example, mobile washers are not small dischargers. Recommendations in this manual for "Mobile washers" should be followed.

Do Sischarge to a sanitary sewerage system when possible. If you are not sure the nearby drain is a sanitary sewer, contact your local sewer utility.

- If a sanitary sewerage system is not available, discharge to a landscaped, grassy ground surface, or dirt area where the washwater can soak into the ground or evaporate. Note: soapy washwater may adversely affect landscaping. Discuss this option with the building owner.
- ❖ Keep a distance of at least 100 feet from a well head if discharging to ground.
- ❖ Minimize the amount of soaps and detergents used.

Don't • Do not discharge to a surface water or a storm sewer.

Do not clean engines or do any cleaning involving strong acids, caustics, or other metal brighteners.



Charity Car Washes

Do • Discharge washwater to a sanitary sewer where available.

- ❖ Dispose washwater to grassy (preferred) or dirt areas where it can soak into the ground or evaporate.
- ❖ Keep a distance of at least 100 feet from a well head if discharging to ground.
- ❖ When washing is over an impervious area like pavement, that drains to a storm sewer or dry well, a temporary plug should be placed in the storm drain and the accumulated water pumped to the nearest sewerage system. Talk to your local sewer utility about diverting washwater to the sanitary sewer through collection and pumping.
- Minimize the amount of soaps and detergents used.

Don't • Do not discharge to storm sewers or surface waters.



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Appendix

Applicable Washington State Law and Regulations

Chapter 90.48 RCW, **Water Pollution Control**, requires "...the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington."

Washington State Regulations promulgated by the Department of Ecology to fulfill the intent of Chapter 90.48 RCW are:

Chapter 173-200 WAC, Water Quality Standards for Ground Waters of the State of Washington.

Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington.

Chapter 173-216 WAC, **State Waste Discharge Permit Program**, applicable to discharge of waste materials from industrial, commercial, and municipal operations into ground and surface waters of state and into municipal sewerage systems.

Chapter 173-218 WAC, **Underground Injection Control Program**, prohibits discharge of wastewater into wells.

Chapter 173-220 WAC, **National Pollutant Discharge Elimination System (NPDES) Program**, applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state, operating under state law as a part of the NPDES created by section 402 of the Federal Water Pollution Control Act (FWPCA).

Chapter 173-240 WAC, **Submission of Plans and Reports for Construction of Wastewater Facilities**, requires that engineering reports and plans and specifications for the project shall be submitted to and approved by the department (Ecology).

Contacts

If you have questions or would like more information, please contact Foroozan Labib at Ecology Headquarters office in Lacey at (360) 407-6439 (voice) (360) 407-6006 (TDD) or contact the Ecology regional office nearest you:

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|----------------|---------------------------|--|
| Andy Tom | Eastern Region Spokane | (509) 456-2875 (voice) (509) 448-2055 (TDD) |
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18 Appendix

Ecology Regional Offices



Appendix 19